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COMBINED SEWER OVERFLOWS (CSOs) AS SOURCES OF SEDIMENT CONTAMINATION IN THE LOWER PASSAIC RIVER, NEW JERSEY. II. POLYCHLORINATED DIBENZO-P-DIOXINS, POLYCHLORINATED DIBENZOFURANS, AND POLYCHLORINATED BIPHENYLS

S.L. Huntley*[1], T.J. Iannuzzi[1], J.D. Avantaggio[1], H. Carlson-Lynch[1], C.W. Schmidt[1], and B.L. Finley[2]

[1]ChemRisk, Division of McLaren/Hart, 1685 Congress St., Portland, ME 04102, USA
[2]ChemRisk, Division of McLaren/Hart, 29225 Chagrin Blvd., Cleveland, OH 44124, USA

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ABSTRACT

Polychlorinated biphenyls (PCBs) and polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) are contaminants ubiquitous to the sediments of industrialized waterways. Non-point sources, such as atmospheric deposition, urban runoff, and combined sewer overflows, are recognized by the U.S. Environmental Protection Agency as important uncontrolled sources of these compounds. The purpose of this study was to investigate the impact of combined sewer overflows (CSOs) on sediments of the Passaic River in New Jersey. In this investigation, we (1) characterize PCB and PCDD/F contamination in sediments impacted by these CSOs, (2) evaluate the spatial distribution of these contaminants, and (3) evaluate the possible sources of PCBs and PCDD/Fs within the respective CSO districts. Ten surficial sediment samples were collected adjacent to each of four CSO outfalls along the lower Passaic River and analyzed for coplanar PCBs and PCDD/Fs. Principal components analysis (PCA) was utilized to assess differences in the distributional patterns of PCB and PCDD/F congeners at each of the four CSO sampling areas. The results indicate that sediments proximate to the CSO outfalls are contaminated with elevated concentrations of these compounds. The spatial distribution and fingerprint patterns of PCBs and PCDD/Fs strongly suggest that the CSOs are a source of contamination in sediments near these outfalls. Evaluation of the industries operating within the CSO districts provides a link between the facilities that discharge wastes to the combined sewer system and PCBs and PCDD/Fs found in the sediments. Until adequate controls are implemented, CSOs will continue to be significant on-going sources of PCB and PCDD/F contamination affecting the water and sediment quality of the Passaic River.

*To whom correspondence should be addressed.